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09/938,453	08/24/2001	Howard C. Huang	17-8-15-15	2231

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Docket Administrator (Room 3J-219)
Lucent Technologies Inc.
101 Crawfords Corner Road
Holmdel, NJ 07733-3030

EXAMINER

PHU, PHUONG M

ART UNIT	PAPER NUMBER
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2611

DATE MAILED: 11/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/938,453

Applicant(s)

HUANG ET AL.

Examiner

Phuong Phu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 July 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,7-21 and 23-42 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 30-34 is/are allowed.
- 6) ☒ Claim(s) 1-3,8-15,17-21,23-29,35-37,41 and 42 is/are rejected.
- 7) ☒ Claim(s) 7,16 and 38-40 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This Office Action is responsive to the Amendment filed on 7/7/06. Accordingly, claims 1-3, 7-21 and 23-42 are currently pending; and claims 4-6 and 22 are canceled.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 25-28 rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01.

-Claim 25 recites the limitation “a space time regenerator coupled to said joint equalizer; and a buffer-subtractor coupled between said signal detectors and said joint equalizer and between said space time regenerator and said joint equalizer”.

The phrase “a space time regenerator coupled to said joint equalizer” renders the claim vague on whether the input of the “space time regenerator” is coupled to the input of the “joint equalizer” or the output of the “joint equalizer” or whether the output of the “space time regenerator” is coupled to the input of the “joint equalizer” or the output of the “joint equalizer”. In addition, the phrase “a buffer-subtractor coupled between said signal detectors and said joint equalizer and between said space time regenerator and said joint equalizer” render the claim vague on whether the input of the “buffer-subtractor” is coupled to the input of the “space time regenerator” or the output of the “space time regenerator” or whether the output of the “buffer-

subtractor” is coupled to the input of the “space time regenerator” or the output of the “space time regenerator”.

This vagueness leads to an omission for essential structural/functional/connectional cooperative interrelationships of the “space time regenerator”, “joint equalizer” and “buffer-subtractor” to one another for making the claimed receiver as a completely operative and connective device.

-Similarly, claims 26 and 28 recite the phrase “a front end processor coupled to said buffer-subtractor” which renders the claim vague on whether the input of the “front end processor” is coupled to the input of the “buffer-subtractor” or the output of the “buffer-subtractor”, or whether the output of the “front end processor” is coupled to the input of the “buffer-subtractor” or the output of the “buffer-subtractor”. This vagueness leads to an omission for essential structural/functional/connectional cooperative interrelationships of the “front end processor” and “buffer-subtractor” to each other for making the claimed receiver as a completely operative and connective device.

-Similarly, claim 27 recites the limitation “an error correction decoder coupled to said soft bit mapper; space time regenerator coupled to said error correction decoder; and a buffer-subtractor coupled between said signal detectors and said joint equalizer and between said space time regenerator and said joint equalizer”. It is vague on whether the input or output of the “error correction decoder” is coupled to the input or output of the “soft bit mapper”, whether the input or output of the “space time generator” is coupled to the input or output of the “error correction decoder”, and whether the input or output of the “buffer subtractor” is coupled to the input or output of the “space time generator”. This vagueness eads to an omission for essential

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structural/functional/connectional cooperative interrelationships of the “error correction decoder”, “soft bit mapper”, “space time regenerator”, “joint equalizer”, “signal detectors”, and “buffer-subtractor” to each other for making the claimed receiver as a completely operative and connective device.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-3, 8-12, 15, 17-19, 23, 24, 29, 35, 36, 37, 41 and 42 are rejected under 35

U.S.C. 102(e) as being anticipated by Jalali et al (7,027,523), newly-cited.

-Regarding to claim 1, see figures 3B and 4, and col. 16, line 50 to col. 19, line 27, Jalali et al discloses a method for compensating for time dispersion in a receiver (150a) (see figure 4) of a wireless system that has a plurality of transmit antennas (124a,...,124t) (see figure (3B) and a plurality of receive antennas (152a,...,152r) (see figure 4), the method comprising:

step (154a,...,154r) (see figure 4) of receiving samples for each receive antenna;

step (406a,...,406r, 408, 410) (see figure 4) of determining joint equalizer solution (see (412, 414, 416,418) of figure 4) using channel information (see (416, 418)) for at least one pairing of at least one of said transmit antennas and said receive antennas; and applying said determined joint equalizer solution to said received samples ($r_{_}$) from at least one of said receive antennas to develop equalized samples ($y_{_}$); wherein said step of determining a joint equalizer

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solution is performed at least partly in the discrete frequency domain (see outputs of (406a, 406r) of figure 4) (see col. 17, lines 23-62, col. 19, lines 17-27).

-Regarding to claim 2, Jalali et al discloses said joint equalizer solution is configurable to be a MMSE solution, (considered here equivalent with the limitation “joint minimum mean square error (MMSE) solution”) (see col. 19, lines 17-27).

-Regarding to claim 3, Jalali et al discloses step of estimating a channel (see (416) of figure 4) for at least one pairing of at least one of said transmit antennas and said receive antennas (see figures 3B and 4, and col. 17, lines 23-62).

-Regarding to claim 8, see figures 3B and 4, and col. 16, line 50 to col. 19, line 27, Jalali et al discloses a method for compensating for time dispersion in a receiver (150a) (see figure 4) of a wireless system that has a plurality of transmit antennas (124a,...,124t) (see figure (3B) and a plurality of receive antennas (152a,...,152r) (see figure 4), the method comprising:

step (154a,...,154r) (see figure 4) of receiving samples for each receive antenna;

step (410) (see figure 4) of determining joint equalizer solution (see (412, 414, 416,418) of figure 4) using channel information (see (416, 418)) for at least one pairing of at least one of said transmit antennas and said receive antennas; and applying said determined joint equalizer solution to said received samples ($r_{_}$) from at least one of said receive antennas to develop equalized samples ($y_{_}$); and

step (432) (see figure 4) of despreading “discovering” said equalized samples (see col. 3, lines 21-22, col. 10, lines 61-64, col. 11, lines 29-35, col. 18, lines 12-14).

-Regarding to claim 9, Jalali et al discloses that at least two of said transmit antennas transmit antennas are configurable to transmit at different rates (see col. 4, line 60 to col. 5, line 5, col. 13, lines 11-17, 43-46).

-Regarding to claim 10, Jalali et al discloses that at least two of said transmit antennas are configurable to transmit antennas transmit using different transmit constellations (see figures 3A, 3B, col. 12, line 60 to col. 13, line 2, col. 14, lines 54-60, col. 16, lines 50-56).

-Regarding to claim 11, Jalali et al discloses step (436) (see figure 4) of performing soft bit mapping using a version of said equalized samples (via “a Turbo decoder or a Viterbi decoder”) (see col. 18, lines 14-24).

-Regarding to claim 12, Jalali et al discloses that said version of said equalized samples are despread samples (see figure 4, col. 18, lines 13-25).

-Regarding to claim 15, Jalali et al discloses that said determining step is performed multiple times, once for each “frequency subchannel”, namely for each one of said transmit antennas (see col. 17, lines 42-62).

-Regarding to claim 17, Jalali et al discloses that said joint equalizer solution is configurable to be a minimum mean square error solution, (considered here equivalent with the limitation “joint least mean square (LMS) solution”) (see col. 19, lines 17-27).

-Regarding to claim 18, as similarly applied to claim 1, 8, 11, set forth above and herein incorporated, see figures 3B and 4, and col. 16, line 50 to col. 19, line 27, Jalali et al discloses a receiver (150a) (see figure 4) for use in a multiple-input multiple-output (MIMO) system in which a plurality of signal detectors (152a,..., 152r, 154a,...,154r) (see figure 4) receive signals

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transmitted by a plurality of signal sources (124a,...,124t) (see figure (3B), said receiver comprising:

a joint equalizer (410) (see figure 4) that develops a joint equalizer solution using channel information (see (416, 418)) for at least one pairing of at least one of said signal sources and said signal detectors and supplies as an output a signal ($y_{_}$) that includes at least said joint equalizer solution applied to a signal ($r_{_}$) received by at least one of said signal detectors (see col. 17, lines 23-62, col. 19, lines 17-27);

a soft bit mapper (436) (see figure 4) for developing soft bits from said joint equalizer output (see col. 18, lines 14-24); and

a despreader (432) (see figure 4) interposed between said joint equalizer and said soft bit mapper (see col. 3, lines 21-22, col. 10, lines 61-64, col. 11, lines 29-35, col. 18, lines 12-14).

-Claim 19 is rejected with similar reasons set forth for claim 2.

-Claim 23 is rejected with similar reasons set forth for claim 9.

-Claim 24 is rejected with similar reasons set forth for claim 10.

-Regarding to claim 29, Jalali et al discloses comprising an order controller (408) (see col. 4) for determining an order in which signals from said signal detectors will be processed by said joint equalizer.

-Regarding to claim 35, Jalali et al discloses said MIMO system is a wireless system, said signal sources are transmit antennas and said detectors are antennas of said receiver (see figure 4).

-Regarding to claim 36, Jalali et al discloses that said joint equalizer develops said joint equalizer solution as a function of estimates of the channels between each of said signal sources and said signal detectors (see col. 4, lines 22-62).

-Regarding to claim 37, Jalali et al discloses said joint equalizer develops and applies said joint equalizer solution in a time domain (see figure 4, col. 7, line 45 to col. 10, line 23, col. 17, lines 48-62).

-Claim 41 is rejected with similar reasons set forth for claim 17.

-Regarding to claim 42, as similarly applied to claim 1, 8, 11, 18, set forth above and herein incorporated, see figures 3B and 4, and col. 16, line 50 to col. 19, line 27, Jalali et al discloses a receiver (150a) (see figure 4) for use in a multiple-input multiple-output (MIMO) system in which a plurality of receive antennas (152a,...,152r) (see figure 4) receive signals transmitted by a plurality of transmit antennas (124a,...,124t), said receiver comprising:

means (406a,...,406r, 408, 410) (see figure 4) for developing a joint equalizer solution using channel information for at least one pairing of at least one of said transmit antennas and said receive antennas, said joint equalizer solution being developed at least partly in a frequency domain, and supplying as an output a signal that includes at least said equalizer solution applied to a signal received by at least one of said receive antennas; and

means (436) (see figure 4) for developing soft bits from said joint equalizer output

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 13 and 21 rejected under 35 U.S.C. 103(a) as being unpatentable over Jalali et al in view of Liang et al (6,314,147), newly-cited.

-Regarding to claims 13 and 21, Jalali et al neither discloses whether said step of performing soft mapping further comprises step of spatial whitening said version of said equalized samples, as claimed in claim 13, nor discloses a spatial whitening unit.

However, Jalali et al teaches that step of performing soft mapping can be performed via a Viterbi decoder (see col. 18, lines 19-22).

Liang et al teaches a Viterbi decoder (210) comprises a whitening filter for whitening the input signal before being Viterbi decoded for improving the performance of the Viterbi decoder (see figure 5, col. 14, line 60 to col. 15, line 60).

It would have been obvious for one skilled in the art to implement Jalali et al Viterbi decoder in such a way that the Viterbi decoder further comprises a whitening filter for whitening the input signal before being Viterbi decoded, as taught by Liang et al, so that the performance of the Viterbi decoder would be improved.

With such the implementation, Jalali et al in view of Liang et al teaches step of spatial whitening said version of said equalized samples, as claimed in claim 13, and teaches whitening filter, (considered here equivalent with the limitation “spatial whitening unit”, as claimed in claim 21) .

8. Claims 14 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jalali et al in view of Crozier et al (6,145,114), newly-cited.

-Regarding to claims 14 and 20, Jalali et al neither discloses whether said step of performing soft mapping further comprises the step of performing a posteriori probability (APP) metric processing on said version of said equalized samples, as claimed in claim 14, nor disclose an APP metric processor, as claimed in claim 20.

However, Jalali et al teaches that step of performing soft mapping can be performed via a Turbo decoder (see col. 18, lines 19-22).

Crozier et al teaches a Turbo decoder which comprising device performing a posteriori probability (APP) metric processing on it input signal (see figure 4, col. 7, lines 20-27).

Since Jalali et al does not teach in detail how the Turbo decoder is implemented, it would have been obvious for one skilled in the art during building or carrying out Jalali et al invention, to implement the Turbo decoder in such a way that the Turbo decoder comprising device performing a posteriori probability (APP) metric processing on it input signal, as taught by Crozier et al, so that the Turbo decoder would be obtained as required in the invention.

With such the implementation, Jalali et al in view of Crozier et al teaches step of performing a posteriori probability (APP) metric processing on said version of said equalized samples, as claimed in claim 14, and teaches said device, (considered here equivalent with the limitation "APP metric processor", as claimed in claim 20.

Allowable Subject Matter

9. Claims 7, 16, 38, 39, 40 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. Claims 30-34 are allowed.

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11. Claims 25-28 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Response to Arguments

12. Applicant's arguments with respect to claims 7, 16, 25-28, 30-34, 38, 39, 40 have been considered. The claims are now indicated allowable set forth above.

13. Applicant's arguments with respect to the rest of the claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phuong Phu whose telephone number is 571-272-3009. The examiner can normally be reached on M-F (8:00 AM - 4:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on 571-272-2988. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Phuong Phu
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11/8/06

PHUONG PHU
PRIMARY EXAMINER

Phuong Phu
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Art Unit 2611